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Title
Biomechanical foot analysis in clinical practice in Flanders, a survey

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Summary
The purpose of this study was to investigate to what extent different techniques are employed in biomechanical foot analysis in Flanders. 11 Foot experts were interviewed to evaluate this. Remarkable differences were found regarding preferred tools and required analysis time (from 5 to 30 minutes).

Introduction
Treatment or prevention of specific foot problems often requires an analysis of the biomechanics of the foot. These analyses can be performed by different types of experts. Specifically, in Flanders, they may be performed by orthopedic surgeons, rehabilitation specialists, orthopedic technologists, or podiatrists. It is well known that there is no standardization of clinical methods to analyze foot biomechanics. Methods range from straightforward functional analyses to investigation of a static footprint and/or even dynamic video analysis. The purpose of this study was to investigate to what extent different methods and techniques are used in current clinical practice in Flanders. The collected data served as a starting point for the development of a form which will be applied by ten experts to analyze foot biomechanics in hundred healthy subjects. Later on, the expert analyses will be correlated with advanced lab measurements.

Methods
To investigate the current clinical practice of biomechanical foot analyses a group of 11 experts was selected. The selection was based on years of experience and willingness to cooperate. The group contained representatives of all expert types. Specifically, 4 podiatrists, 5 orthopedic technologists and 2 medical doctors were interviewed extensively by two researchers. The interviews gauged their experience: amount of years in practice and of weekly foot analyses.

Also, they were questioned on their source of knowledge: what studies they pursued and to what extent they follow a standard protocol or whether their methods are experience based. Each expert was also asked about tools and equipment he or she uses to analyze feet, and what features are taken from these measurements. Finally, each expert was asked about the detailed sequence of steps during a standard foot analysis, and the total time required. Data obtained during the interviews were imported and analyzed in Excel.

Results

The experts had on average 17 (±11) years of experience and perform 23 (±18) foot analyses weekly. The duration of analyses was very different between experts. Doctors reported only 5-10 minutes per patient where podiatrists spend 20-30 minutes and orthopedic technicians 10-15 minutes. All reported times exclude time to take sizes and discuss the results with the patient.

A standard analysis of foot biomechanics contains the same main parts for all experts: starting with a conversation about the patients' current complaints and medical history, followed by static and dynamic analyses. However, details of the analyses were very different. All experts indicated visual analysis to be the most important. Measurements of joint angles are made by 3 out of 4 podiatrists and 1 out of 5 orthopedic technologists. All doctors and 4 out of 5 orthopedic technicians analyze the pressure distribution on the foot sole during relaxed stance. Dynamic pressure distribution is analyzed by 2 out of 4 podiatrists and 2 out of 5 orthopedic technicians. Video cameras were used by all podiatrists and 1 out of 5 orthopedic technicians to record a close-up during walking (Fig. 1).

All experts followed the standard education required for their profession. However, all reported that their current practice is more based on experience than on any protocol or theory that they learned during their education. Although only two doctors were included, they claimed that differences with colleagues are minor.

Conclusion

All experts work very much experience-based; none of them follows a standardized protocol. Visual analysis is the most important element: half of the experts don't use any equipment for dynamic analysis. For functional and static analysis, the foot print analyses are popular with

orthopedic technologists and doctors, video analyses with podiatrists. The time required to perform a biomechanical foot analysis was very different, yet, similar within expert types.
We conclude that there are considerable differences in terms of time, methods, materials and terminology between different types of experts regarding foot analyses. In our opinion, this variability reflects the lack of a thorough understanding of foot function. For this purpose, a large study is underway in which ten experts will all analyze the same subjects. Their findings will be compared with advanced lab tests. This will lead to a sound basis for foot analyses and more standardization which will be beneficial for patients.

References

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